On the next Oppositions of Mars for the Determination of the Solar
Parallax, and the Remarkable Agreement of the Parallax
obtained from the Opposition of 1860, with M. Cornu's New
Measure of the Velocity of Light.   By M. E. Liais.

(Translation.)

Now that the public attention is particularly called to the
solar parallax in consequence of the last transit of *Venus* over
the Sun's disk, it is not without interest to notice the remarkable
agreement which exists between the parallax deduced from the
opposition of *Mars* in 1860, the values of the aberration of light
according to the *ensemble* of the determinations of Struve,
Lindenau, Lundhal, and Peters, and the new determination of
the velocity of light by M. Cornu by means of observations
between the Observatory of Paris and the tower of Montlhéry,
which has come to my knowledge from the *Comptes Rendus* of
the Academy of Sciences at Paris, of the 14th December 1874,
which has just reached me.

M. Cornu has already noticed in his remarkable work that the
constant of aberration determined by Struve at $20''\cdot445$, com-
bined with the new measure of the velocity of light, gives for the
solar parallax the value $8''\cdot797$, a number differing only by $0''\cdot04$
from the value $8''\cdot760$, which I deduced from my observations of
the opposition of *Mars* in 1860, see *Comptes Rendus*, January 23,
1865, and my work *L'Espace Celeste*, p. 33.

The agreement is still more remarkable, if, instead of employ-
ing only the observations of Struve for the constant of aberration,
we use also those of Lindenau, Lundhal, and Peters on the Pole-
Star; in fact, the observations of M.M.

		$''$
Struve	give	$20\cdot445$
Lindenau	„	$20\cdot449$
Peters	„	$20\cdot503$
Lundahl	„	$20\cdot551$
Mean is		$20\cdot487$

This mean combined with M. Cornu's value of the velocity of
light gives $8''\cdot779$ for the value of the solar parallax, differing
from my value $8''\cdot760$ being less than $0''\cdot02$: an agreement which
is extraordinary in relation to the great difference of the methods
employed for the determination of the three elements, aberration,
velocity of light, and solar parallax obtained by the opposition of
Mars, observed from a same point on the east and the west of
the meridian, by measuring with a repeating theodolite the dif-
ference of the altitudes of the planet and of a neighbouring star
in a low latitude, that of Rio Janeiro, where the planet passes
the meridian in the neighbourhood of the zenith.

The difference of the value which I published ten years

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ago, and that deduced from the value of the aberration given by M. Peters and from M. Cornu's value of the velocity of light, is even only $0''\cdot01$, and exactly agrees with the mean of the determinations of MM. Peters and Lundahl, which give $20''\cdot527$ for the aberration.

It is right to observe that the observations of *Mars* in 1862 were not made in such favourable conditions; first, because the parallax of the planet was less in 1862 than in 1860; and secondly, because the methods employed at this epoch required the co-operation of several stations and several observers; so that the influences of the modes of pointage of the individual observers were not eliminated, as in the observations of 1860; which explains the divergency of the results obtained.

But *Mars* will be again in opposition in the month of June (1875), and, as in 1860, will pass very near the zenith of Rio Janeiro, and in conditions of nearness to the Earth similar to those of 1860. The Imperial Observatory of Rio, which has numerous instruments of precision, the setting up of which is in course of completion, will not fail to use this new opportunity of determining the solar parallax. Still better conditions will exist in 1877—epoch at which the parallax of *Mars* will attain a value sensibly equal to that of the parallax of *Venus* diminished by the solar parallax, the element to which the observations of the transit of *Venus* have reference.

The possibility of referring the position of *Mars* to that of the neighbouring stars,—while *Venus* can only be referred to the Sun's limbs, which appear subject to variations and irregularities, as indicated by the projections of the faculæ accidentally observed away from the limb, and the depressions in the neighbourhood of the spots—gives to the observations of *Mars*, in the conditions in which this planet will be in 1877, an incontestable superiority in comparison with the method which has for its object to refer the positions of *Venus* to the centre of the Sun at the times of the transits of this planet.

This opposition of 1877 will be observed at the Imperial Observatory of Rio Janeiro with greater resources than were at my disposal in 1860, and with a still larger parallax of the planet, and I thus hope for an excellent direct determination of the solar parallax; the more so in presence of the remarkable agreement which I have just called attention to between the best determinations of the aberration and the velocity of light, and the direct measure of the parallax obtained in 1860.

The observations which I propose to have made this year at the Imperial Observatory of Rio have the especial object of fixing the choice of the most perfect methods to be employed in 1877.

Rio de Janeiro.